

Dimensions of the type, an adult female in alcohol, somewhat elongated by compression in the stomach of its original collector:—

Head and body 120 millim., tail 68, hind foot 21, ear (above crown) 12; heel to front of last foot-pad 9·3; length of last foot-pad 2·2; hairy part of sole 7.

Skull: basal length 26·5, tip of nasals to back of interparietal 27; greatest breadth 16; nasals, length 9·1, breadth 3·7; interorbital breadth 4; interparietal, length 4, breadth 8·3; diastema 8; length of upper molar series 6·9; anterior palatine foramina 6.

Hab. Kia-ting-fu, West Sze-chuen (*A. E. Pratt, Esq.*).

XV.—*Natural History Notes from H.M. Indian Marine Survey Steamer 'Investigator,' Commander R. F. Hoskyn, R.N., commanding.*—Series II., No. 1. *On the Results of Deep-sea Dredging during the Season 1890–91.* By J. WOOD-MASON, Superintendent of the Indian Museum, and Professor of Comparative Anatomy in the Medical College of Bengal, and A. ALCOCK, M.B., Surgeon I.M.S., Surgeon-Naturalist to the Survey.

[Continued from p. 34.]

Family **Macruridæ**.

MACRURUS, Bl.

Subgenus **CÆLORHYNCHUS**, Giorna.

24. *Macrurus quadricristatus*, sp. n.

B. 6. D. 11. A. circ. 90. P. 16. V. 7.

Head like that of *Trachyrhynchus* and much exceeding the rest of the trunk in all three dimensions; tail very low, compressed, and tapering.

The head is more than three times the rest of the trunk in length, and nearly one third the total. The depressed snout is exceedingly long and acutely triangular; its length, which is nearly half that of the head, is more than twice the major diameter of the large oval eye and twice the width of the interorbital space across the middle; six sevenths of its total

extent is preoral. The suborbital crest is strongly salient and serrated and terminates acutely at the preopercular angle. The posterior half of the head is longitudinally traversed on each side by two strongly serrated ridges, which are either bony crests or the modified spines of scales that are indetachably adherent to the bones beneath; one extends from the interorbital space to the occiput, the other from the supra-orbital ridge to the shoulder.

Nostrils situated immediately in front of the eye; the posterior is very large.

The mouth is a small, completely inferior, crescentic orifice; its front limit is in the vertical through the anterior nostril, and the maxilla reaches a little behind the vertical through the middle of the eye. Villiform teeth in bands in the jaws, the outer row in the upper jaw slightly enlarged. Barbel slender, less than half the eye in length.

Gill-opening rather wide, the membranes united quite anteriorly; first gill-cleft very narrow; the gill-rakers are small tubercles; pharyngo-branchial membrane quite black.

Body and head except the glosso-hyal region covered with acutely spinigerous scales; those on the body are of one uniform size throughout, measuring rather over 2 millim. in either diameter in the specimen examined.

A scale from the head bears about three longitudinal serrate or spinate carinæ; one from the side of the body bears five slightly divergent antero-posterior ridges, which are armed with long imbricating aculeate spines, the last in each ridge projecting far beyond the edge of the scale. There are 6 or $6\frac{1}{2}$ scales in a row between the posterior limit of the first dorsal fin and the lateral line. No scaleless fossa on the nape. The first spine of the first dorsal fin is very small, the second is smooth throughout. The interval between the first and the very inconspicuous second dorsal is hardly half the extent of the base of the first. Pectorals narrow and pointed, their length slightly exceeds that of the postorbital portion of the head. Ventrals with the outer ray prolonged.

Stomach large, siphonal; many long slender cæca in a thick cluster round the pylorus; apparently no air-bladder.

Colours in life:—Chocolate; body and tail with numerous broad black cross bands, which do not reach the mid-abdominal line.

Two specimens, measuring one 7, the other 4·5 inches, from Station 115, 188 to 220 fathoms, and a third small specimen from Station 116, 405 fathoms.

Subgenus *MACRURUS*, Bl.

25. *Macrurus nasutus*, Gthr.

Macrurus nasutus, Günther, 'Challenger' Deep-sea Fishes, p. 132, pl. xxx. fig. B.

A specimen of this Japanese form was taken in the Laccadive Sea, Station 107, at 738 fathoms.

26. *Macrurus Wood-Masoni*, Alcock.

Macrurus Wood-Masoni, Alcock, Ann. & Mag. Nat. Hist., Oct. 1890, p. 301.

A male nearly 18 inches long from Station 109, 738 fathoms.

27. *Macrurus investigatoris*, Alcock.

Macrurus investigatoris, Alcock, Ann. & Mag. Nat. Hist., Nov. 1889, p. 391.

Numerous specimens from Station 115, 188 to 220 fathoms, and from Station 120, 240 to 276 fathoms.

28. *Macrurus semiquincunciatus*, Alcock.

Macrurus semiquincunciatus, Alcock, Ann. & Mag. Nat. Hist., Nov. 1889, p. 392.

One specimen from Station 120, 240 to 276 fathoms.

29. *Macrurus macrolophus*, Alcock.

Macrurus macrolophus, Alcock, Ann. & Mag. Nat. Hist., Nov. 1889, p. 394.

Two fine specimens from Station 120, 240 to 276 fathoms.

The type appears to have sustained an injury to the tail, as the relative length of the head to the body in these specimens is about 1 : 4½.

30. *Macrurus Petersoni*, sp. n.

B. 7. D. 10-11. A. circ. 135. P. 18-20. V. 8.

Length of head about one fifth total and about seven ninths of the entire head and trunk. The length of the subtriangular snout is equal to the major diameter of the eye, slightly in excess of the width of the interorbital space, and slightly over one fourth the length of the head.

Mouth inferior, large, the maxilla reaching behind the

vertical through the middle of the orbit. Villiform teeth in a broad band in the upper and a narrow band in the lower jaw, the outer row in the upper jaw considerably enlarged. Barbel a little longer than the eye.

Gill-openings wide, the gill-membranes separate; pharyngo-branchial membrane partially pigmented.

Body and head, except the glosso-hyal region, covered with thin, imbricating, deciduous scales of uniform size, which are spinigerous except in a small area situated immediately behind the base of the first dorsal fin, where they are enlarged, circular, and quite smooth. A scale from the side of the body bears from 15 to 30 equal, distant, semi-erect spinelets in a shallow quincuncial arrangement. There are six rows of scales between the posterior border of the first dorsal fin and the lateral line.

The dorsal fins are separated by an interval equal to at least twice the basal extent of the first; the first spine of the first dorsal is rudimentary, the second, which is hardly prolonged, is closely and finely serrated. The anal fin begins immediately behind the vertical through the last ray of the first dorsal. Pectorals narrow, pointed; their length equals that of the postorbital portion of the head. Ventrals short, only a little longer than the barbel.

The vent is situated between the ventrals immediately behind their base, the intestine forming a wide loop behind it.

Colours in the fresh state:—Head and iris silvery; body chocolate, with an underlying silvery lustre; throat and belly black; first dorsal fin black, with white base and tip.

Two specimens (one an adult ovigerous female), 9.5 inches long, from Station 115, 188 to 220 fathoms.

I have named this species after Mr. Peterson, the gunner of the 'Investigator,' whose unabating zeal on behalf of our zoological collections led on one occasion to his getting his fingers almost amputated by the dredging-wire, and on another occasion to his falling overboard almost into the mouth of a shark.

Subgenus MYSTACONURUS, Gthr.

31. *Macrurus heterolepis*, Alcock.

Macrurus heterolepis, Alcock, Ann. & Mag. Nat. Hist., Nov. 1889, p. 396.

Very numerous specimens of all sizes were taken at Station 115, 188 to 220 fathoms.

There are seven branchiostegal rays; the mouth-cleft

reaches nearly to the vertical through the posterior border of the orbit; the pectorals reach to the sixth anal ray.

Colours in life:—Head and iris silvery; body pinkish brown, with a silvery sheen; throat and abdomen black, first dorsal, ventrals, and pectorals with black base and white tips, second dorsal and anal white.

Subgenus MALACOCEPHALUS, Gthr.

32. *Macrurus levis*, Lowe.

One specimen of this widely ranging deep-sea form was taken at Station 115, in 188 to 220 fathoms.

It measures a little more than a foot in length.

BATHYGADUS, Gthr.

33. *Bathygadus longifilis*, Goode & Bean.

Bathygadus longifilis, G. & B., Proc. U. S. Nat. Mus. viii. p. 599; and Günther, 'Challenger' Deep-sea Fishes, p. 157.

Hymenocephalus longifilis, Vaillant, Exp. Sci. Trav. et Talism., Poiss., pp. 218-221, pl. xxiii. fig. 1.

Bathygadus longifilis, Alcock, Ann. & Mag. Nat. Hist., Oct. 1890, p. 302.

A very fine and perfect male specimen, 13.25 inches long, was taken at Station 113, in 683 fathoms. It has the formula

B. 7. D. 12/130. P. 14. V. 8. L. lat. 150.
L. tr. 25 through vent.

The barbel is nearly two thirds the length of the head and much longer than the barbel of the large female specimen caught last year in the Laccadive Sea.

Family Ateleopodidæ.

ATELEOPUS, Schleg.

34. *Ateleopus indicus*, sp. n.

B. 8. D. 8. A. + C. 76. P. 12. V. 2.

Soft tissues almost gelatinous, skeleton cartilaginous.

Head broad and acutely conical, body and tail much compressed and tapering.

The length of the head is equal to that of the rest of the trunk and is contained about $5\frac{3}{4}$ times in the total; the

greatest height of the body, at the shoulder, is three fourths the length of the head.

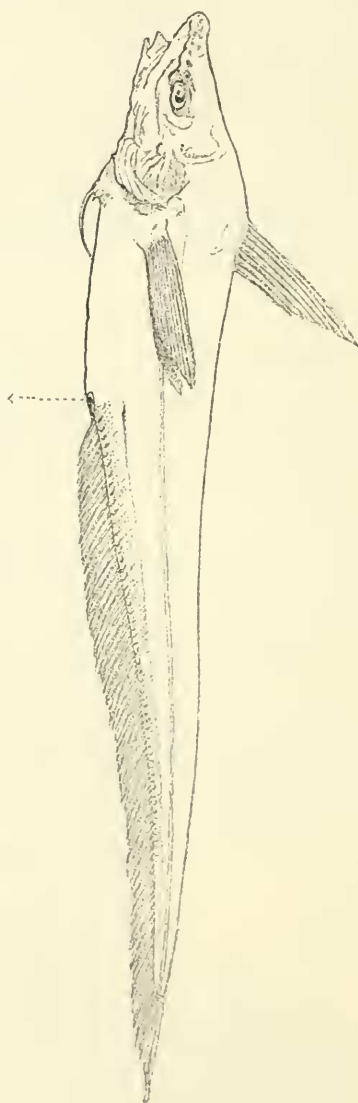
The broad, depressed, projecting, marginally inflated snout is one third of the head in length and twice the major diameter of the oval eye; at least half its extent is preoral. The mouth is a small, quite inferior, crescentic orifice, in width equal to the diameter of the eye, its angle barely reaching the vertical through the anterior border of the orbit, though the maxilla reaches nearly to the vertical through the middle of the orbit; it is strongly protractile downwards, and looks as if adapted for suction. There appears to be a narrow band of very minute teeth in the inner aspect of the upper jaw; but the lower jaw is quite toothless.

The nostrils, which are very large, are situated superiorly immediately in front of the eye.

The gill-openings are narrow, the membranes being united to the isthmus anteriorly; gill-rakers short, coarse, cartilaginous.

Head, body, and fins uniformly invested with a soft, thick, gelatinous, scaleless skin.

A single dorsal fin, the base of which is about three fourths



of a snout-length in extent, beginning almost in the vertical through the base of the pectoral; its height, which about equals the length of the latter, is six sevenths of the length of the head. The anterior rays of the anal fin are barely two thirds the body-height at their origin, the succeeding rays slightly increase in length to the confluence with the caudal; the latter is a little more than half a head-length in extent. The ventrals are jugular; each is in the form of a stiff, slightly flexible, cartilaginous rod, which is formed of two stout rays coherent throughout their whole extent, and not reaching halfway to the vent; a small detached tubercle posterior to this represents a rudimentary third ray.

Stomach long, simple; intestine short and wide; no pyloric cæca; no air-bladder.

Colours in the fresh state:—Mottled dark brown to purple-black; fins black, except the ventral.

One specimen, a foot long, from Station 115, 188 to 220 fathoms.

It will be remembered that the family Ateleopodidæ has hitherto been represented by a single species, *Ateleopus japonicus*, Schleg., from Japan. It is therefore highly interesting to find another and very closely allied species in the Bay of Bengal.

Family Pleuronectidæ.

APHORISTIA, Kaup.

35. *Aphoristia septemstriata*, sp. n.

D. 97. A. 80. C. 12. V. 4. L. lat. 92-94.

L. tr. 40.

The length of the head is not quite one fifth, the height of the body a little more than one fourth, of the total length, without caudal. The length of the snout is about $\frac{2}{3}$ that of the head. Eyes situated almost in contact and almost between the same verticals in the anterior third of the head, their diameter being about one eighth the length of the head. On the left side is a conspicuous tubular nostril on the upper lip, and a small circular nostril in front of the interorbital space; on the right side no nostrils are visible.

Cleft of mouth slightly oblique, its angle hardly reaches behind the vertical through the anterior border of the lower orbit; small teeth on the blind side only.

Gill-openings very narrow; branchiostegal rays and membrane prolonged beyond the opercular edge.

Entire body and head, including the snout, jaws, and eyes up to the corneal margin, covered with small, adherent, ctenoid scales; no lateral line.

The dorsal fin begins above the middle of the upper eye: its longest rays, which are just in advance of the middle of the fin, are a little more than two fifths of the body-height in length and not quite so long as the corresponding anal rays. The distance from the tip of the snout to the origin of the anal fin is about equal to the body-height. The length of the caudal is contained about $7\frac{1}{2}$ times in the total. The ventrals are separated from the anal by an interval equal to the length of the snout.

Colours in the fresh state:—Left side warm brown, with seven complete rather broad cross bands.

Two specimens, nearly 4 inches long, from Station 115, 188 to 220 fathoms.

Order PHYSOSTOMI.

Family Sternoptychidæ.

ARGYROPELECUS, Cocco.

36. *Argyropelecus*, sp. prox. *hemigymnus*, Cocco.

A small specimen was taken at Station 118, in 1803 fathoms; it agrees very closely with *Argyropelecus hemigymnus*, Cocco, from which it differs most conspicuously in having the luminous spots in a continuous unbroken series from the head almost to the base of the caudal; the tail also is not so abruptly constricted off from the abdomen.

This, so far as I know, is the first record of *Argyropelecus* from the Indo-Pacific.

POLYIPNUS, Gthr.

37. *Polyipnus spinosus*, Gthr.

Polyipnus spinosus, Gthr., 'Challenger' Deep-sea Fishes, p. 170, pl. li. fig. B.

Polyipnus spinosus, Alcock, Ann. & Mag. Nat. Hist., Nov. 1889, p. 398.

Eight fine specimens were taken at Station 115, in 188 to 220 fathoms. They have the formula

B. 6. D. 12-13. A. 15-16,

and their length ranges from 2 to 2.5 inches. The scales are quite membranous: one from the side of the trunk measures

7.5 millim. in its vertical and about 2.5 millim. in its antero-posterior diameter; one from the middle of the tail measures about 6.25 millim. in its vertical and not quite 2 millim. in its antero-posterior diameter.

GONOSTOMA, Rafinesque.

38. *Gonostoma elongatum*, Gthr.

Gonostoma elongatum, Günther, 'Challenger' Deep-sea Fishes, p. 173, pl. xlv. fig. B.

One fine mature male was taken at Station 107, in 738 fathoms. It measures 7.75 inches in length. It has the formula

D. 13. A. 30. P. 12. V. 8.

There are no scales, and the fish in the fresh state is uniformly enveloped in thick tenacious mucus. In addition to the luminous organs described by Dr. Günther there is an elliptical organ of moderate size in the middle of the posterior border of the preoperculum on each side, and one of similar shape and size on each side of the mandibular symphysis. There are six large pyloric cæca.

Colours in the fresh state:—Jet-black; luminous organs bright rose-pink, with silvery margins.

CHAULIODUS, Bl. Schn.

39. *Chauliodus Sloani*, Bl. Schn.

Fine specimens of this well-known bathybial, or nocturnal pelagic, type were taken in the Laccadive Sea, the Andaman Sea, and the Bay of Bengal. One specimen taken at Station 109, 738 fathoms, was a mature female with the enlarged ovaries extending on each side along the entire length of the abdominal cavity, the ova being smallish (a little over half a millimetre in diameter) and very numerous.

The stomach of this specimen was deeply siphonal, the cæcal prolongation extending more than one third the length of the body-cavity. There were three moderate-sized pyloric cæca.

Family Scopelidæ.

HARPODON, Le Suer.

40. *Harpodon squamosus*, sp. n.

B. 17. D. 12-14. A. 13-15. P. 10. V. 9.

Tissues extremely delicate; the paired fins long, feathery, fragile.

The length of the head, measured to the edge of the operculum and not to the end of the produced branchiostegal rays and membrane, is about one fifth, the height of the body between one sixth and one seventh of the total, without the caudal. The vertex of the head with numerous mucous pores.

Snout broad, depressed; its tip is formed by the projecting lower jaw, and its length, including the mandibular element, slightly exceeds the major diameter of the eye, which is about one eighth the length of the head as above limited. The width of the flat interorbital space is twice the vertical diameter of the eye.

Mouth-cleft oblique, wide; the maxilla is nearly two thirds the length of the head as above limited. Introrsely-depressible cardiform teeth in bands in both jaws; one series in the lower jaw enlarged, with barbed hastate tips, and one series in the upper jaw less enlarged; in each palatine an outer irregularly-double row of teeth, of which the anterior and external are enlarged, and a very short inner irregularly-double row; hyoid bone and all the branchial arches toothed.

Gill-openings extremely wide; the branchiostegal rays and membrane much produced beyond the operculum.

Body, posterior part of head, and cheeks covered with deciduous cycloid scales, which are less deciduous on the posterior half of the tail.

The dorsal fin arises within the anterior half of the body (measured with the caudal) just posterior to the vertical through the base of the ventrals. The anal arises about an eye-length behind the vent, which is nearly twice as far from the gill-opening as from the base of the caudal. The fimbriated adipose dorsal is situated far back, above the posterior half of the anal. Caudal deeply forked, with an inconspicuous median lobe. Ventrals long, delicate, and feathery, the longest (middle) rays almost reach to the vent in the adult. Pectorals very narrow and fragile; they arise almost on the same plane with the eyes, and their longest (middle) rays do not quite reach to the dorsal fin.

Stomach with a very long caecal sac; eighteen large pyloric caeca in a pectinate arrangement.

Colours in life:—Hyaline grey; paired fins and caudal black, visceral peritonaeum black, buccal and branchial cavities partially and slightly pigmented.

Numerous specimens, of which several are mature females with gravid ovaries and two appear to be sexually mature males, from Station 120, 240 to 276 fathoms.

The mature females are from 9 to 10·5 inches long, the males from 7·5 to 8·5 inches long.

BATHYPTEROIS, Gthr.

41. *Bathypterois Guentheri*, Alcock.

Bathypterois Guentheri, Alcock, Ann. & Mag. Nat. Hist., Dec. 1889, p. 450.

One well-preserved specimen from Station 112, 561 fathoms.

SCOPELUS, Gthr.

42. *Scopelus engraulis*, Gthr.

Scopelus engraulis, Günther, 'Challenger' Deep-sea Fishes, p. 197, pl. li. fig. C.

Two specimens (one young, the other a mature female nearly 5·5 inches long) from Station 115, 188 to 220 fathoms.

There are seven large pyloric cæca, and an air-bladder is apparently absent.

In the young specimen, which is not quite 2·5 inches long, the diameter of the eye is still contained $4\frac{1}{2}$ times in the length of the head, and is greater than the width of the inter-orbital space.

NEOSCOPELUS, Johnson.

43. *Neoscopelus macrolepidotus*, Johnson.

Neoscopelus macrolepidotus, Johnson, P. Z. S. 1863, p. 44, pl. vii.

Scopelus macrolepidotus, Günther, Cat. Fish. v. p. 414, and 'Challenger' Deep-sea Fishes, p. 196.

Four fine specimens from Station 115, 188 to 220 fathoms, all sexually mature.

Colours in the fresh state:—Head, iris, sides of tongue, and belly burnished silver, dorsum of body plum-purple, flanks golden.

Family Stomiatiidæ.

STOMIAS, Cuvier.

44. *Stomias elongatus*, sp. n.

D. 19. A. 21. P. 6. V. 6.

Body compressed, low, its height being one fifteenth of the total without the caudal; the length of the head measured from the tip of the mandible is about one tenth of the same.

Eye circular, its diameter not quite one fourth of the head-length, and equal to the width of the interorbital space.

The widely-distensible mandible projects much beyond the upper jaw. Five large, distant, fixed fangs in each premaxilla, as well as a freely movable one near the symphysis; a few minute, inconspicuous, distant denticulations in the maxillæ; eight or nine moderate-sized laterally-projecting fangs on each limb of the mandible, decreasing in size from before backwards; a fang on each side of the vomer, and two small, distant, incurved teeth on each palatine.

The barbel, which is as long as the caudal fin, is trifid at its extremity. Opercular bones membranaceous.

No scales; the body, which is coated with tenacious mucus, is mapped out into silvery hexagonal areolæ. There are on each side along the ventral surface of the body two rows of small luminous organs; the internal extends from the mandibular symphysis to the base of the caudal, but, owing to the denudation of the integuments of the tail, the number of its constituents cannot be determined beyond the origin of the anal fin, up to which point there are 57, namely, to the base of the pectorals 9, to the base of the ventrals 51, to the origin of the anal 57; the external extends from the base of the pectoral to the origin of the anal, and numbers 45. There is a single luminous organ on the barbel and a row along the base of the branchiostegal rays. The dorsal fin arises at the level of the third anal ray. Caudal pointed, its length is about one twelfth of the total. The pectorals, which arise near the ventral profile, are equal in length to the caudal. The ventrals are very long, reaching to the sixth anal ray.

Colours in the fresh state:—Jet-black, with silvery hexagonal markings.

One specimen, a little over 5 inches long, from Station 107, 738 fathoms.

Family Clupeidæ.

BATHYCLUPEA, gen. nov.

Head and body compressed, the former with the mucous cavities highly developed. Abdomen neither serrated nor keeled. Mouth with the lower jaw strongly prominent. Small teeth in the jaws, palatines, and vomer. Gill-openings very wide, the membranes entirely separate; 7 branchiostegals; pseudobranchiæ large. Body covered with large deciduous scales; lateral line distinct. Dorsal fin situated in the posterior half of the body, arising behind the origin of the elongate anal. Pectorals very large, entire. Ventrals small or rudimentary, *subjugular in position*. Caudal forked. Pyloric appendages in moderate number.